The computing research community is effective for two reasons: great researchers, and great researchers who are willing to give some of their time to serve the research community. There are a number of ways to provide service to the community. For example, it might take the form of reviewing papers and proposals or by serving on editorial boards, review panels, or conference program committees. Or it might involve chairing a program or serving as editor-in-chief of a journal. Virtually everyone does some of this on a part-time basis.

Service might also be provided to a broader community through a part-time role as a member or officer of the CRA board of directors. And opportunities exist on a national level to serve full-time in a rotating position at a government agency. These government positions include program director, division director, or CISE assistant director at NSF; or program manager and office director at DARPA; or other government funding agencies.

This past year, two senior members of our community completed full-time service roles and returned to their academic positions. Shankar Sastry (Berkeley) served for two years as Director of the Information Technology Office at DARPA, where he was responsible for a computing research budget in excess of $200M. Ruzena Bajcsy (Penn) completed more than 3 years as CISE assistant director, the longest serving CISE A D since the directorate was created, and the first woman to hold this position. Ruzena managed a directorate budget that grew from approximately $300M when she joined NSF to more than $450M during the past fiscal year. CRA honored Ruzena for her service at a reception (see photo elsewhere in this issue).

Our thanks to Ruzena and Shankar, and to the many other rotators who serve or have served at NSF, DARPA, and other funding agencies.

Our community appears to be ambivalent about taking up this kind of full-time community service with a funding agency. Going to Washington, it is argued, disrupts the pace of innovation is continuing, amid increasing consolidation within technologies, industries, and infrastructure elements. One panel (personal/individual security) and four PITAC subcommittees provided briefings. The national security panel did not brief the committee at this time. Information on the briefings is available on the Web at: http://www.itsd.gov/ 
aclagenda/2agenda_25sep01.html. Some brief highlights of the reports are provided here.

The Panel on Personal/Individual Security reported that it had met with a number of government agencies and will meet with privacy advocates. One finding is that a fundamental definition of "identity" is needed. Identity theft is a major problem and a compromise is needed that will address the needs of business to collect information and the need for consumers to protect their personal information. This issue requires the attention of both business and government. The Subcommittee on Socioeconomic, Education, and Workforce Issues (SEW) reported that while many high-quality grant applications had been submitted to participating agencies (NSF, DOE, NASA, and N IH), only a few could be funded. Funding levels are still too low, and

A reader will know, NSF research programs are run by program directors (P Ds), who are a mix of federal employees and rotators. Our rotator P Ds provide NSF with, among other things, an "academic flavor" that helps to make it the least bureaucratic of federal agencies. Rotators are indispensable in helping to provide the staff power to get our work done. So the first reason to consider coming to NSF as a rotator is to help assure our ability to continue providing research support to the CISE community.

And there are personal benefits to being a rotator as well as benefits to the CISE community. First, you have the interesting experience of helping to shape the NSF program(s) serving your area of expertise. This can involve re-focusing a program’s area and/or developing new program areas. Putting in place the right program announcements and leading the effort to evaluate and fund proposals written in response to those announcements can be both challenging and rewarding. Second, you not only have a chance to interact broadly with the members of your community, but you also may want to get involved with

Continued on Page 7

PITAC Reviews Progress, Moves Forward

The President’s Information Technology Advisory Committee (PITAC) in A rlington, VA on September 25 to review progress in implementing the recommendations of its 1999 report, Information Technology Research: Investing in Our Future. Over the next few months the findings of the original PITAC report will be revised and presented for comment at the committee’s next meeting in February 2002.

In an open session of the committee, NSF Director Rita Colwell praised the 1999 report as influential and indicated that “PITAC has been indispensable to NSF.” In her view, “Investing in IT is one of the most important things we can do for our country.” She announced at the meeting that NSF would make 309 awards totaling $315 million as part of the Information Technology Research (ITR) initiative. More than 2,000 proposals were received.

The committee devoted one session to a discussion of issues resulting from recent changes in the environment of the IT industry. Among these, the changing fortunes of many dot-com companies, the drop in the availability of venture capital, and the uncertainties in the economy. Overall, committee members expressed optimism that the current downturn offers many opportunities. It also presents new opportunities for IT. From the perspective of the IT workforce, some observed that more researchers would return to and remain in universities, rather than move to industry positions. There also was a sense among the members that the pace of innovation is continuing, amid increasing consolidation within technologies, industries, and infrastructure elements.

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Continued on Page 7

Rotators Help Shape NSF Programs

By George Straw

If you are a mid-career or senior computer and/or information science and/or engineering faculty member (briefly, a member of the CISE community), why should you consider coming to NSF as an "Intergovernmental Personnel Act (IPA) assignee" for a couple of years? And if you do consider it, how easy might it be to do?

The author of this article, who went to NSF twice as a "rotator," will offer some answers to these two questions. (The informal term "rotator" can refer to both IPA and several other modes of temporary NSF employment. I'll use it here to refer to an "IPA rotator" because the IPA mechanism is usually the appropriate one for a university faculty member to use.)

A reader will know, NSF research programs are run by program directors (P Ds), who are a mix of federal employees and rotators. Our rotator P Ds provide NSF with, among other things, an "academic flavor" that helps to make it the least bureaucratic of federal agencies. Rotators are indispensable in helping to provide the staff power to get our work done. So the first reason to consider coming to NSF as a rotator is to help assure our ability to continue providing research support to the CISE community.

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Continued on Page 7
Expanding the Pipeline

Transforming the Culture of Computing at Carnegie Mellon

By Lenore Blum


In 1995, the Computer Science Department at Carnegie Mellon University (CMU) began an effort to bring more women into its undergraduate computer science (CS) program. At that time, just 7 percent (7 out of 96) of entering computer science majors at CMU were women. Five years later, in 1999, the percentage of women in the entering class had increased fivefold to about 30 percent (50 out of 130). Rather than an endpoint, the increasing number of women in the program signifies the beginning of a crucial period of transition for women in computer science at CMU. We are now faced with the challenge of ensuring that women and men in the program thrive. Starting in the academic year 1999-2000, there has been a concerted effort to foster a community committed to this process.

Before outlining the factors that have been crucial to the success of our efforts thus far, it is worth noting that such dramatic increases in the number of women in computer science do not appear to be widespread. In fact, the widely cited statistics from the articles “The Incredible Shrinking Pipeline” and “The Incredible Shrinking Pipeline Reversal” indicate that the percentage of women entering computer science programs and program were inaugurated in 1965; the undergraduate major was not instituted until 1988 (first as a Math/CS major and then in 1992 as a CS major). Typically, students enter the computer science major as freshmen. In 1988, the department evolved into the School of Computer Science (SCS), which now comprises seven departments including the (CSD), and institutes of education and research. Each of the divisions offers graduate programs, undergraduate students major in CS, but can also dual major in another program.

Research Basis to Support Change

During its first several years, the undergraduate CS program was plagued by low numbers of women—a trend common to most comparable Ph.D.-granting CS departments. In 1995, A. I. Fisher, then a Carnegie Mellon University Professor, spearheaded an intensive effort to understand the reasons for the underrepresentation of women. He collaborated with Jane M. Margolis, a social scientist and expert in gender equity in education, on a research study aimed at acquiring a deeper understanding of the nature of the problem and establishing a sound basis from which to develop interventions.

Funded by the Sloan Foundation, the project consisted of hundreds of interviews with both male and female CS students about their histories with computing, interests, motivations and aspirations, reasons for majoring in CS, and their experiences in the undergraduate program. Conducted over a four-year period, the project was able to track many students throughout their time at CMU. By interviewing students once a semester, the researchers witnessed the ups and downs of their experiences and changes in attitudes over time. Most importantly, they were able to identify crucial periods in the students’ attachments to the field, and factors that contributed to, or inhibited, their ability to succeed.

The study yielded significant insights into the many layers of the problem, not only in terms of bringing women into computer science, but also of retaining them. Four problem areas were identified: 1) experience gaps, 2) confidence doubts, 3) the curriculum and pedagogy, and 4) peer culture.

The findings of this study have been well documented elsewhere, but we will not go into details here. Suffice it to say that the project set the stage for further efforts, including developing a blueprint for action, which is now available as an informational resource for faculty and other potentially supportive parties.

Summer Institute for AP CS Teachers

Clearly the problem of few women entering the field of computer science is inherited. For example, in 1997 only 17 percent of Advanced Placement (AP) CS test-takers were female, the lowest of any AP exam that year. This amounted to a gain of only 1 percent in 10 years.

We are working to expand the pipeline by introducing revisions in the AP CS exam, the NSF issued a call for proposals to prepare high school teachers for the change. A. I. Fisher saw this as a fortuitous opportunity to work with teachers to address gender-gaps issues while they were motivated to gain new expertise. Thus the Summer Institute for CS & Advanced Placement Teachers (SAAP) was conceived, with a grant from the NSF. Fisher—along with Jane M. Margolis, computer equity expert JoSanders, and A. I. Fisher—led the effort.

REMINDER TO CS AND CE CHAIRS:

Taulbee Surveys Were Due November 2.
Please make certain your survey has been submitted to:
www.cra.org/Survey/FillOut
Questions?
Contact: survey@cra.org

COMPUTING RESEARCH NEWS
November 2001
Page 2
Survey Shows Significant Increases in CS Research Lab Salaries

By David Waltz

In November 2000, CRA conducted its fourth Industrial Salary Survey of CS Research Laboratories. Organizations were asked to provide data about base salary (the annual salary independent of items such as bonus and options) and total compensation, which includes variable cash and variable non-cash compensation (items such as bonuses and the value of stock options which respondents were asked to estimate). The survey collected minimum, average, and maximum salaries for researchers in their first year after receiving their degrees and for four additional five-year periods. Companies that completed the survey received the results in January 2001.

Fourteen organizations representing 1,189 researchers responded to the 2000 survey. (In 1999, twelve organizations with 1,378 researchers participated.) Of these researchers, 72 percent held Ph.D.s, 21 percent M.S. degrees, and 6 percent B.S. degrees. A portion of the survey’s results are summarized in Figure 1, which reports both the means and medians of base salaries and total compensation for researchers with doctorates.

Although there are differences in how salary data are tabulated and reported between this survey and CRA’s Taulbee Survey of Ph.D.-granting CS/CE departments, Table 1 provides nine-month faculty salary data for the 2000/2001 academic year.

Observations

Compensation was strikingly higher in 2000 than in 1999, especially for the most highly paid researchers and for those with the most experience. For those with six or more years of experience, the average maximum total compensation more than doubled, with those having 16 or more years of experience averaging a maximum of $405,000! For the same period, the average base salaries of those with doctoral degrees increased between 5 percent and 29 percent, while average total compensation increased between 17 percent and 39 percent. In 2000, average variable compensation appears to have accounted for between 14 percent and 30 percent of total compensation.

Table 1. AY00/01 Nine-month Salaries among U.S. CS Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th>Average of all Salaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Tenure Teaching Faculty</td>
<td>$51,909</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td>$68,628</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>$76,997</td>
</tr>
<tr>
<td>Full Professor</td>
<td>$99,690</td>
</tr>
</tbody>
</table>

Source: CRA 1999-2000 Taulbee Survey

Computer Discipline Tops the List

These recent increases are due, in large part, to the continued rise in students studying in departments of computer engineering. In 1999, the number of freshmen in computer engineering departments totaled 14,504. In 2000, the number had grown by a third to 19,311. As a percentage, this large increase is actually slightly less than the increase from 1994 to 1995, when the total jumped from 5,939 to 7,922. The computer engineering departments have been growing rapidly since 1992, which followed a few years of drop-off (see chart 1).

The Engineering Workforce Commission (EW C), which conducts the surveys on which the Engineering and Technology Enrollment series is based, increasingly encounters a
Driven by decreasing costs and increased capabilities, computing and communications technology is being embedded into a growing range of devices including handheld personal digital assistants, home appliances, and vehicles. Networks. Beyond desktops and laptops connected to the Internet, information technology is connecting a variety of devices and sensors that will allow information to be collected, shared, and processed in unprecedented ways. Such networked systems of embedded computers are being deployed in applications from automotive telemetry to precision agriculture, military defense systems, from smart homes and buildings to in situ environmental monitoring to biotechnology research. The enabling technology underlying automatic speech recognition is still in its infancy. This article, a synopsis of the author's recent CRA Digital Government Fellowship lecture, will first briefly survey the state of the art in the field of automatic speech recognition. It will then make a case in favor of graphical models as one of the methodologies holding promise to greatly improve speech recognition algorithms.

Jeff Bilmes

Jeff Bilmes is the chief CRA Digital Government Fellow. The following article is a synopsis of his presentation to the Office of Engineering and Technology at the Federal Communications Commission on June 11, 2001.

In 1968 it was predicted that by 2001 we would have a high 9000 computer with the ability to transcribe, understand, and respond to human speech. Here we are, nearing the end of 2002, and what do we have instead? We have desktop PCs that can produce transcriptions (often erroneous) of clearly articulated speech. We can use our voice to make airline reservations, via a cell phone, or give commands to home appliances. We can use our voice to send voice mail messages to friends and family. Yet we have made very little progress in understanding spoken language. The primary technology behind automatic speech recognition is inspired by statistical communication theory, where a sound message is sent through a noisy communication channel to a receiver. The job of the receiver is to infer the most probable original message. In automatic speech recognition, however, a message might undergo several noisy transmission stages before arriving at its ultimate destination. Consider, for example, the following sequence between an original message and its final destination (the ear); aconceptual idea, a string of words, a string of phones, and an acoustic waveform, first as emitted by the human vocal apparatus and then as presented to the auditory system. Communication theory requires an understanding of the statistical relationships between the message and its various representations. The statistical relationships between the message and the final destination (the ear) are as follows:

Jeff Bilmes
Historical Trends from Taulbee Surveys: Ph.D. Programs and Ethnicity
By Jay Vegso

This is the third in a series of articles on trends in data from the Taulbee Survey and its antecedents, which stretch back to 1970. The first two articles dealt with faculty salaries and the number of women who have received degrees or who are university faculty members. This article reports on the ethnicity of computer science and computer engineering (CS/CE) Ph.D. recipients and students in the United States and Canada.

A. All of these articles are available on the CRA website (www.cra.org).

Due to changes in the Taulbee Survey, including the addition of new ethnic categories, it is difficult to summarize long-term trends. As a result, Table 1 reports the ethnic background of CS/CE Ph.D. recipients since the 1993-94 academic year, when the categories and data attained consistency.

As can be seen, the proportion of Ph.D.s granted to non-Hispanic whites ("whites") has generally declined over the past three years, while the proportion granted to non-resident aliens has increased steadily. Indeed, 1999-2000 was the first year in the history of the survey in which a greater proportion of doctorates were granted to nonresident aliens than to whites. The decline in the proportion of degrees going to whites has not translated into gains for other ethnic groups, however, and the Asian or Pacific Islanders group has even experienced a decline of its own.

While the proportions in Table 1 are useful for tracking trends, the actual number of degrees granted to the different ethnic groups can present a starker picture. Since 1970, 8,605 CS/CE doctorates have been granted to whites, while only 145 have been granted to African-Americans. Since 1984, when the Taulbee Survey started to track Hispanics as an ethnic group, 6,429 doctorates have been granted to whites, while only 222 have been granted to Hispanics.

Enrollment data can suggest possible trends in future Ph.D. production. These figures are given in Table 2, which tracks the percentage of enrolled Ph.D. students by ethnicity. As in Table 1, the two most noticeable trends are the increase in the proportion of nonresident aliens and the decline of whites who are seeking their doctorates. A similar trend has been noted for the other ethnic groups, albeit with lesser representation than they were in 1993-94. All of this would suggest that a greater proportion of Ph.D.s will be granted to nonresident aliens in the coming years, at the expense of whites and African-Americans.

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Admissions
A round 1995, Raj Reddy, then Dean of Computer Science, articulated his desire to attract students to Carnegie Mellon who demonstrate the potential to be world leaders and visionaries in computer science. The CMU Admissions Office responded to Reddy’s vision by expanding the range of qualities that were looked for in CS applicants. In addition to demonstrated academic competence, the Admissions Office began giving more weight to non-academic factors, looking for applicants with leadership potential and a commitment to “give back to the community.” These broadened criteria also became important in awarding financial aid.

A bout the same time, Allan Fisher also conveyed to the Admissions Office his goal of a gender-balanced program. He felt it was important to get the message out that “no prior programming experience is necessary” to enter the CMU computer science program. The image of a CS student as someone (usually male) who has played with computers since early childhood is widespread. This often discourages girls from entering the field. This type of a problem, and the end result, are more than the coding details in between…..

Community Building and Networking
The most extensive single activity of the Women@SCS is a support network for computer science at Carnegie Mellon. The Women@SCS Advisory Council was created in fall 1999, and has since met weekly during the academic year. Membership includes undergraduates representing all four years and graduate students representing the various departments within SCS. The Council meets, and ensuing conversations, whether in person (the Council logs voluminous email correspondence), determine the Council’s priorities and evolving agenda for action. A top priority is community building.

Outreach
The Women@SCS Advisory Council is involved in establishing a network of women in computer science. The Council also acts as a resource and sounding board for the faculty and administration about issues affecting undergraduates. These issues can be quite specific. For example, the Council has reviewed TA training videos and provided feedback to a sociology professor. More generally, the Council has been, and continues to be, a source of information about women in computer science for the campus community and the university at-large. The Women@SCS website (http://www.cs.cmu.edu/~women) is a “must see” to get a feel for the enormous scope of our activities.

Evaluation and Impact
We believe the following features have been crucial to the success of our efforts:

• A vision articulated by key faculty and administrators stressing that a more diverse student body is not only good for potential students, but is crucial to the intellectual health and future of CMU’s computer science program as well as the entire field.

• A solid base of research from which to make change and educate faculty and students, and a commitment to act.

• Expected and experienced researchers, faculty, and administrators at the helm of the effort, working to bring others on board.

• An articulate and committed group of women undergraduate and graduate students who have gained the recognition and respect of the faculty and administration.

• The growing reputation of CMU as a place that wants women and values their presence.

• Support from the President of the university that has enabled us to bring speakers to campus; organize events, workshops, and outreach activities; and send students to professional meetings.

There is a growing perception among faculty and administration that the student body is “more interesting than ever before.” The awareness of pressing issues—such as the curriculum and climate—appears to be increasing, particularly among core faculty involved in undergraduate teaching and key administrators. We are witnessing a major transformation in the culture of computing.

In Conclusion
Increasing and maintaining the presence of women in computer science at levels equal to men necessitates taking a hard look at, and changing, business as usual. In the past, the culture, environment, and expectations of the undergraduate CS program have served male students better than female students, although it has not been optimal for many male students either. Many of the changes we have been advocating—particularly regarding curricular, advising, pedagogy, and social norms—are not gender-specific. Many are applicable in other educational settings, for example in high school, and we want to continue to be a source of information about women in computer science for the campus community and the university at-large.
CRA Honors Ruzena Bajcsy

Ruzena Bajcsy has been appointed the new director of the Center for Information Technology Research in the Interest of Society (CITRIS) at the University of California, Berkeley. CITRIS is one of four California Institutes for Science and Innovation. It brings together the U.C. campuses at Berkeley, Davis, Merced, and Santa Cruz with private industry to develop innovative technology that tackles some of society's most pressing problems. Dr. Bajcsy, previously Professor of Computer and Information Science at the University of Pennsylvania, recently completed her term as Aistant Director of CISE at the National Science Foundation.

Stephen D. Skillicorn has been named Dean of the new College of Computing Sciences at the New Jersey Institute of Technology where he is Professor of Computer Science and Professor of Information Systems. He previously chaired the Department of Computer Science at Colorado State University.

George O. Strawn has been named Acting Assistant Director of the Directorate for Computer and Information Science and Engineering (CISE) at the National Science Foundation, effective September 2001. From January 1999 through August 2001 he was the Executive Officer of CISE.

CISE researchers in this field are scattered across many disciplines with few opportunities to interact. Gail's goals include finding ways to foster this interdisciplinary research field and increase its visibility, perhaps by providing opportunities such as workshops and an annual conference to bring the diverse researchers together.

The Software Subcommittee expressed satisfaction with the response to the 1999 report funding recommendations, with increases to NSF and to some mission agencies. Interagency collaboration and planning has been excellent, and ITF is making a big difference resulting in new kinds of projects, new collaborations (e.g., between biology and IT), and grants of various sizes and durations. However, there is a lack of risk-taking in proposals and many excellent proposals could not be supported for lack of funding. Progress has been made in sponsoring and encouraging multidisciplinary research, but it needs to be strengthened within ITF.

The Scalable Information Infrastructure Subcommittee reported the agencies' responses to the PITAC recommendations. A agencies involved—NSF, DARPA, DOE, NAA, NIST, NOAA, and NSA—have implemented a large number of projects recommended by the 1999 report. There is evidence of increased interagency coordination, and the Large-Scale Networking New Visions workshop continues to advance the research agenda. Funding mechanisms have been broadened from small, single projects to the grand and large multi-Pi projects funded for multiple years.

The High-End Computing Subcommittee indicated satisfaction that progress has been made in achieving its recommendations. Examples of funding to build the Distributed Terascale Facility and a movement to RISC-based massively parallel processors (MPPs) future considerations include the convergence of computing and communications, the continuation of Moore's Law with 16 GHz processors by the end of the decade, and sustained petaflop computing.

Paul Domic, representing the White House, reported that the confirmation hearing for John H. Marburger, III, nominated by the President to be Director of the Office of Science and Technology, was expected to take place in mid-October. Once the director and associate directors are in place, it is likely that the current vacancies on PITAC will be filled. Domic reported that most agency budgets (with the exception of DOD and HHS) are moving and have passed both House and Senate, but have not gone through conference.

Additional information about PITAC and its activities is available on its website at: http://www.itsd.gov/itac.
muddling of the data between computer engineering and computer science. To date, the EWC’s standard approach has been to collect data on the number of students within each engineering college, regardless of program title, and then publish the data with program title details so that careful users can parse the information at the level of their choosing. However, the EWC’s “computer” discipline has increasingly become confounding, since it includes nearly as many computer science students as computer engineering students. In fact, on close inspection, it is found that the computer discipline for the class of 2000 can be broken into these five subgroups (see table 1). This is an issue the EWC will most likely address by splitting its broader computer discipline into, specifically, computer engineering and computer science. This may seem an obvious solution, but the issue is further muddled by the large numbers of computer science students who study outside of engineering departments and will not be included in EWC surveys.

Other Engineering Disciplines of Choice

Of 22 disciplines tracked by the EWC, 10 engineering disciplines accounted for at least 1,000 freshmen each (see table 2). Three disciplines are dominant in size, with more than 12,000 freshmen each:

- Computer
- Electrical and electronics
- Mechanical

An intermediate group accounted for about 5,000 to 7,000 freshmen each:

- Civil
- Chemical
- General

And four other disciplines accounted for more than 1,000 freshmen each:

- Aerospace
- Industrial
- Bioengineering
- Engineering science

A very high number of freshmen engineering students— for example, 27,078 in 2000—are classified as pre-or other-engineering each year. Many engineering colleges require their freshmen to wait a year or two before declaring a major field of study; many students simply prefer to wait. In 2000, an additional 4,413 engineering freshmen were spread throughout 12 other disciplines.

Underrepresented Minority Numbers Worsen

For the freshmen class in 2000, underrepresented minorities (African, Hispanic, and Native Americans) within the engineering freshmen class decreased as a proportion of the total class, dropping from 16.7 percent in 1999 to 16.1 percent in 2000. Except for Native Americans, all the minority groups tracked by the EWC grew in number, yet the large overall growth simply outpaced the growth of African Americans and Hispanic Americans. A small group of African Americans and Foreign Nationals are continuing to grow both in number and percentage. The numbers of women grew significantly from 1999 to 2000 (by 1,125), but also decreased as a percentage of the total (see table 3).

Table 1

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>SubGroups within Computer Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>9,241</td>
<td>Computer Engineering</td>
</tr>
<tr>
<td>1,241</td>
<td>Computer Engineering and Electrical Engineering</td>
</tr>
<tr>
<td>8,623</td>
<td>Computer Science, Software Engineering, Information Systems</td>
</tr>
<tr>
<td>72</td>
<td>Blend of Computer Science and Electrical Engineering</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Total Students</th>
<th>%Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>19,311</td>
<td>33.1%</td>
</tr>
<tr>
<td>Electrical/Electronics</td>
<td>12,883</td>
<td>3.0%</td>
</tr>
<tr>
<td>Mechanical</td>
<td>12,806</td>
<td>5.0%</td>
</tr>
<tr>
<td>Civil</td>
<td>6,828</td>
<td>6.9%</td>
</tr>
<tr>
<td>General</td>
<td>6,376</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Chemical</td>
<td>4,938</td>
<td>-4.8%</td>
</tr>
<tr>
<td>Aerospace</td>
<td>5,112</td>
<td>6.7%</td>
</tr>
<tr>
<td>Bioengineering</td>
<td>1,688</td>
<td>-5.8%</td>
</tr>
<tr>
<td>Industrial</td>
<td>1,443</td>
<td>0.6%</td>
</tr>
<tr>
<td>Engineering Science</td>
<td>1,147</td>
<td>0.1%</td>
</tr>
<tr>
<td>Architectural</td>
<td>732</td>
<td>23.9%</td>
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<tr>
<td>Materials</td>
<td>632</td>
<td>14.3%</td>
</tr>
<tr>
<td>Agricultural</td>
<td>557</td>
<td>13.0%</td>
</tr>
<tr>
<td>Marine/Naval Architecture</td>
<td>525</td>
<td>23.0%</td>
</tr>
<tr>
<td>Environmental</td>
<td>365</td>
<td>-9.4%</td>
</tr>
<tr>
<td>Petroleum</td>
<td>354</td>
<td>2.9%</td>
</tr>
<tr>
<td>Systems</td>
<td>331</td>
<td>-6.2%</td>
</tr>
<tr>
<td>Mining</td>
<td>259</td>
<td>25.1%</td>
</tr>
<tr>
<td>Engineering Management</td>
<td>143</td>
<td>7.5%</td>
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<tr>
<td>Manufacturing</td>
<td>130</td>
<td>-28.6%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>106</td>
<td>0.0%</td>
</tr>
<tr>
<td>Ceramics</td>
<td>49</td>
<td>-44.3%</td>
</tr>
<tr>
<td>Pre- or Other-Engineering</td>
<td>27,078</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

Table 3

<table>
<thead>
<tr>
<th>Population Groups as Percentage of Total</th>
<th>1999</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>19.2%</td>
<td>18.9%</td>
</tr>
<tr>
<td>African American</td>
<td>8.5%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Hispanic American</td>
<td>7.5%</td>
<td>7.4%</td>
</tr>
<tr>
<td>Native American</td>
<td>10.2%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Asian American</td>
<td>10.2%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Foreign Nationals</td>
<td>4.4%</td>
<td>4.6%</td>
</tr>
</tbody>
</table>
November 2001

COMPUTING RESEARCH NEWS

Research, International Language Technologies Institute, and the Robotics Institute.
5. The Computing Research A. The A. Nico Habermann Award

I. Notes
1. http://www.mines.edu/fs_home/campicsm/campicsm.html

II. The Computing Research Association

3. Undergraduate and 22 graduate


The Computing Research Association invites nominations for the CRA Distinguished Service Award and the A. Nico Habermann Award for the year 2002. The awards will be presented at CRA’s Conference at Snowbird July 14-26, 2002.

Distinguished Service Award
CRA makes an award, annually, usually to a person who has made an outstanding contribution to the computing research community. This award recognizes work in the areas of government affairs, professional societies, publications or conferences, and leadership that has a major impact on computing research.

A. Nico Habermann Award
CRA makes an award, annually, usually to a person who has made an outstanding contribution to aiding members of underrepresented groups within the computing research community. This award recognizes work in the areas of government affairs, educational programs, professional societies, public awareness, and leadership that has a major impact on advancing these groups in the computing research community.

For a list of previous winners of these awards, see http://www.cra.org/main/cra.awards.html

Nomination Procedure:
The deadline for receipt of nominations is February 12, 2002. Nominations should not exceed two pages in length and should describe the contributions on which the nomination is based. Letters in support of the nomination are welcome but not required. Questions or comments may be addressed to awards@cra.org. Send nominations electronically to: awards@cra.org (in plain ASCII text or as a Word attachment). Alternatively, mail or fax to:
CRA Service Awards
Computing Research Association
1100 17th Street, N.W., Suite 507
Washington, D.C. 20036-4632
Tel: 202-234-2111
Fax: 202-667-1066
E-mail: awards@cra.org
http://www.cra.org/main/cra.awards.html

FEBRUARY 12 DEADLINE FOR CRA SERVICE AWARD NOMINATIONS

The Computing Research Association invites nominations for the CRA Distinguished Service Award and the A. Nico Habermann Award for the year 2002. The awards will be presented at CRA’s Conference at Snowbird July 14-26, 2002.

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CSTA from Page 4
under which EMNets operate exacerbates the difficulties and poses hard problems for the research community. If EMNets are to be designed in a principled way, rather than being assembled using techniques selected on a case-by-case basis and specialized to the system being built, computational models are needed that provide a conceptual framework in which the designs can be created, thought about, and tested. What makes developing the computational model for EMNets so challenging is, again, the combination of constraints under which they will be operating. Combining this with the mission- and sometimes, life-critical nature of these systems makes the development of coherent computational models for these systems a high priority for the academic and industrial research communities.

A Broad Research Agenda
The report outlines a broad-ranging research agenda that will begin to address the problems described above. Specifically, it outlines eight areas in which significant research is required before EMNets can fulfill their potential. Research in broadly relevant areas such as networking and usability that pertain to many of the themes described below is also essential.

2. Adaptation and self-configuration. Techniques to allow adaptive self-configuration of EMNets to match volatile environmental conditions and systems resources in an ongoing dynamic balance.
3. Monitoring and system health. A complete conceptual framework to help achieve robust operation through self-monitoring, continuous self-testing, and reporting of system health in the face of extreme constraints on nodes and elements of the system.
4. Computational models. New abstractions and computational models for designing, analyzing, and describing the collective behavior and information organization of massive EMNets.
5. Network geometry. Ways to support and integrate network geometry (as opposed to just network topology) into EMNets.
6. Interoperability. Techniques and design methods for constructing long-lived, heterogeneous systems that evolve over time and space while remaining interoperable.
7. Integration of technical, social, ethical, and public policy issues. Fundamental research into the nontechnical issues of EMNets, especially those having to do with the ethical and public policy issues surrounding privacy, security, reliability, usability, and safety.

Enabling technologies. Ongoing research into the various components and enabling technologies of EMNets.

A long with significant work in the specific areas outlined above, progress in this area will require an inter- and multi-disciplinary approach on the part of broad communities of researchers. Keeping systems-level issues in mind, even when working at the specific aspect of the problem, will be essential. EMNets present exciting new challenges in information technology, posing fundamental research questions while being applicable to a broad range of problem domains and research disciplines. Without a concerted, comprehensive effort among and within relevant research communities, it is unlikely that the potential inherent in EMNets will be realized. Long-term, forward-thinking, and broad-ranging research programs are crucial to achieving a deep understanding of how to plan and develop these systems. In addition to outlining a technical research agenda, the report also includes general recommendations to federal agencies, including the Defense Advanced Research Projects Agency (DARPA), the National Science Foundation (NSF), and the National Institute for Standards and Technology (NIST).

Looking Forward
Future reports from CSTB will build on the issues raised in Embedded, Everywhere. An ongoing project on authentication technologies and their implications for privacy is studying issues of security and privacy, especially those having to do with the ethical and public policy issues of EmNets.

The issues and research challenges articulated in Embedded, Everywhere aim to be broad and comprehensive and will undoubtedly arise in a variety of ways in a myriad of areas. The scope and breadth of the research problems that need to be solved make it clear that significant interdisciplinary research will be necessary, as approaches and models from a wide variety of disciplines can be brought to bear on the challenges of EMNets. Computer science researchers can take the opportunity presented by networked systems of embedded computers to both broaden and deepen their research programs to address the challenges of EMNets.

Lysette J. Millett, a Program Officer at CSTB, was the study director of Embedded, Everywhere starting in September 2000. Copies of the final report may be purchased from National Academy Press at www.nap.edu. Additional project information is available at www.cstb.org.
Graphical Models from Page 4

In the loosest of terms, a speech recognition system [1] can be deconstructed into four stages: signal processing, acoustic, pronunciation, and language modeling. In the first stage, the acoustic signal is (deterministically) transformed and compressed into a series of feature vectors. In the second stage, probability distributions are created, within the event space of feature vectors, for each component of a word (such as a phone). The third stage consists of using a statistical model of likely pronunciations of each word, and lastly, the fourth stage utilizes a statistical model of likely strings of words. The latter three of the stages together can be described by a hidden Markov model (HMM). First proposed for speech recognition in the 1970s by researchers at IBM and A T & T research, HMMs are still the predominant statistical methodology used for speech recognition.

With much research in the past 20 years has attempted to move beyond the HMM, none of the techniques proposed so far is as powerful as graphical models. Graphical models (GMs) are a flexible statistical abstraction that have been successfully used to describe problems in many domains, ranging from medical diagnosis and decision theory to time-series prediction and signal coding. Intuitively, they generalize many techniques used in statistical analysis and signal processing such as Kalman filters, auto-regressive models, and many information-theoretic coding algorithms. They provide a formal, visual, and graphical language with which one may observe and reason about important properties of random processes and the underlying physical phenomena these processes represent. They also provide a set of computationally efficient decision-making algorithms. Overall, GMs encompass a vast family of statistical techniques.

GMs provide an excellent formalism within which to study, understand, and advance speech recognition. Many existing ASR techniques appear to be representable using GMs, apparently no other known abstraction possesses this property. With GMs, one may quickly evaluate and understand algorithms that otherwise might require a much longer time and discussing and examining fundamentally different algorithms is relatively simple. It can be possible to eliminate a novel, initially promising statistical approach without much programming effort, if it is found to be inadequate. Even though the set of algorithms currently used for ASR is large, this collection occupies a remarkably small area within GM algorithm space. Because so many existing ASR success lies within this vastly under-explored space, it is likely that a systematic study of GM-based ASR algorithms might lead to new, more successful approaches.

While space limitations for this article allow only the most superficial coverage of various graphical models that can offer, the following will touch on some of the critical advantages they provide for ASR. One of the most important being that a collection of random variables is the notion of conditional independence. In particular, suppose that A, B, and C are random variables. If knowledge of A cannot influence B in any way, it is said that A and B are independent. Now, given knowledge of C, if A still cannot influence B in any way, it is said that A and B are conditionally independent given C. Conditional independence is different from independence—that is, if A is independent of B, then A might or might not be conditionally independent of B given C, and vice versa. Conditional independence is an extremely powerful concept. When conditional independence exists, a statistical model can undergo enormous simplifications. Formal properties of conditional independence are described in [2,3].

A graphical model is a graph where nodes correspond to random variables, and edges encode the set of conditional independence properties existing amongst those variables. Why is this useful? First, it provides a method with which one may visualize the static structure of natural signals and scenes (such as speech) when represented as a graph. For example, graphs could show anything from causal relations between high-level concepts down to the fine-grained dependencies existing within the neural code. Second, GMs provide a formal method to evaluate the implications of statistical assumptions made about a physical process. These implications are often not immediately obvious. Third, GMs provide a set of efficient algorithms for statistical decision-making. The algorithms, which correspond to valid manipulation of probability distributions, involve manipulations of the graphs themselves, and are therefore easy to apply irrespective of the particular graph being used. Finally, GMs provide a way to explore the implications of approximation, regarding both the process of decision-making (inference approximation) and approximating a physical process itself. When a new statistical model is used in an ASR system, it is typically fixed and has been created based on assumptions about the nature of speech. An interesting benefit provided by GMs is that the model itself can be tailor-made, based on properties measured within speech data, to match or enhance important dependencies existent within that data. This has been called GM structure learning, since it is the graph itself that is learned.

A corollary, a GM can be minimally designed so that it has representational power only where needed. Such structure learning will concentrate only on those things that will help the recognition task, which means that the exact structure should reflect only those properties that help to distinguish one spoken utterance from potentially confusable others, a crucial concept for structural discriminability [4]. Such GM-based systems can have smaller memory and computational demands than more naively designed systems. A GM-based system can therefore satisfy the principle of parsimony by being accurate and finely tuned to the task at hand.

To deploy a GM as a speech recognition system requires a great deal of programming effort. In order to ameliorate this problem, the author and a colleague at IBM research have been developing a new software toolkit for graphical models [5] specifically optimized for speech recognition and time series modeling tasks. The toolkit, aptly entitled the graphical models toolkit (GMTK), provides a simple graphical programming language, and combines many features found in existing ASR and graphical speech recognition and graphical model software packages. With GMTK, it is possible to quickly specify a model structure and test it on very large speech data sets. The first version of the toolkit will be released, in open source form, early next year, and will be available from the author’s W W W home page. Indeed, automatic speech recognition has come a long way since the era when the Hal 9000 was first imagined, but a long road lies ahead before such an ability will exist. Perhaps graphical models will play an important role in this important endeavor.

Jeff A. Bilmes is an Assistant Professor in the Department of Electrical Engineering at the University of Washington. Email: bilmes@ee.washington.edu. URL: http://www.cs.washington.edu/faculty/bilmes

The CRA Digital Government Fellowship is supported by the National Science Foundation’s Digital Government Program, and is intended to build ties between academic and industrial computing research communities and information technology workers in federal, state, and local governments.

Notes:

DEPARTMENT CHAIRS AND LABS/CENTERS MANAGERS: SNOWBIRD ALERT

Mark your calendars now for CRA’s Conference at Snowbird 2002! This biennial event is a “must” for department chairs and managers of labs and centers. The planning committee is putting together a stimulating program of speakers and workshops, which will also include a workshop for new chairs.

The dates are July 14, 15, and 16, 2002 in Snowbird, Utah. Refer to future issues of C R A and, beginning in January, to the CRA website (http://www.cra.org) for program details and instructions for registration and accommodations.

If you would like to suggest a topic for the program, please contact either of the co-chairs. Members of the program committee include:

Academic Sessions:
Leah Jamieson, Co-Chair <ljj@cgn.purdue.edu>
Jocelyn Garcia
Tom Henderson
Jack Stankovic
Frank Tampa
Roper W e b b

Michigan State University
University of Utah
University of Virginia
University of Western Ontario
Georgia Institute of Technology, EC HD A

Labs/Centers Sessions:
Philip Bernstein, Co-Chair <phil@ microsoft.com> 
Ronald Brauchman
James H olden
Richard Waters

Microsoft Research
A T & T Labs
InterTrust Technologies
Mitsubishi Electric Research Labs

Other programmatic questions should be directed to Jean Smith (jean@cra.org).
CRA Plans Three Workshops

CRA will hold another of its highly successful academic workshops for new faculty and advanced graduate students in computer science, computer engineering, computational science, and other computing-related disciplines on February 10-12, 2002. The workshop, chaired by CRA board member, Lori C. Clarke (UMass—Amherst), focuses on practical methods for having a successful and fulfilling academic career. Topics include selecting and managing a research project, preparing a tenured dossier, mentoring and managing students, time management and family issues, and writing a successful funding proposal. The workshop will include talks by senior members of NSF, DARPA, and the Office of Naval Research, as well as a session by NSF staff on how to write a good funding proposal. For graduate students who wish to attend and whose departments are unable to provide support, CRA can offer approximately 20 scholarships. Preference will be given to students who have passed their qualifying exams. Since these are limited in number, please check with your department before you apply for one of CRA’s scholarships.

This popular workshop will be held at the Key Bridge Marriott Hotel in Arlington, Virginia (Washington, DC area). Those wishing to attend should register without delay. Registration is already brisk, and it will be limited.

Workshop details are available at: http://www.cra.org/committee/education/cra-faculty-workshops

This workshop entitled “Managing the Academic Career” for Faculty Women at Undergraduate Computer Science and Engineering Institutions.” It will be held at SIGCSE 2002 on Wednesday, February 27, from 8:30 a.m. to 5:30 p.m. SIGCSE is the Special Interest Group in Computer Science Education, one of many Special Interest Groups sponsored by ACM.

The workshop will provide faculty members at all levels of undergraduate education with critical information, advice, and tools to build successful careers as academic professionals. In addition, the workshop will afford mentoring activities targeting women in undergraduate computer science. This will be part of the day-long workshop structured as a set of whole-group panel sessions, parallel panel sessions, and formal and informal group activities. Workshop sessions will concentrate on providing mentoring advice by experienced women professors. In addition, sufficient time will be allowed for audience participation and dialogue focusing on issues from a woman’s perspective, making connections with colleagues, and managing workloads by using available resources that may be as yet unknown to everyone.

The workshop is co-chaired by Sheila Catesana (Clarke College) and Joan Francioni (Winona State College). Details will be available on the CRA-W website at: http://www.cra.org/cgi-bin/crashw

With support from the National Science Foundation, the Computing Research Association will sponsor four Workshops Continued on Page 24

**Sponsors—CRA Snowbird Conference 2002**

Our thanks to Microsoft Research and Telcordia Technologies for signing up early as Snowbird sponsors. If you organization would like to become a sponsor, we encourage you to contact Jay Vego at CRA (jvego@cra.org) for details.
Ben-Gurion University
Department of Computer Science
The Computer Science Department at the Ben-Gurion University of the Negev invites applications for tenure-track positions at all levels. Candidates must have a Ph.D. in computer science or a related area and demonstrate excellence in research and teaching. Candidates must have the ability to contribute to the computer science curriculum and to the undergraduate and graduate programs. The appointment is expected to start in Fall 2002. These positions are filled. EOE/AA/IRCA/ADA.

Brooklyn College
The City University of New York (CUNY)
The Department of Computer and Information Science (CIS) is seeking to fill three tenure-track faculty positions, one at the Assistant or Associate Professor level. The Department of Computer and Information Science has 22 full-time faculty, over 700 undergraduate and graduate students, and over 20 full-time faculty members. The winner of the award will develop a research program in the area of computer science and should have demonstrated excellence in research and teaching. The winner will help develop multi-media curricula for the graduate program and is expected to develop a research program in the field. The University is an Equal Opportunity/Affirmative Action employer and women, minorities, and persons with disabilities are encouraged to apply.

Bucknell University
Department of Mathematics and Computer Science
A position is available in computer science. The position will be at the rank of Assistant Professor. Candidates must have a Ph.D. in computer science or a related area and demonstrate excellence in research and teaching. The Department is committed to the highest standards for instruction and research. The University has an enrollment of approximately 2500 students and is one of the top liberal arts institutions in the nation. Women, minority members, and applicants from underrepresented groups are encouraged to apply.

Brown University
Division of Science and Engineering
The Division of Science and Engineering at Brown University announces a tenure-track position in Computer Science. The appointment in the area of AI and machine learning. A Ph.D. in computer science or a related area and demonstrated excellence in research and teaching are required. Women, minority members, and applicants from underrepresented groups are encouraged to apply.

California Polytechnic State University
San Luis Obispo
Computer Engineering Program
A position is open in the Computer Engineering Program at California Polytechnic State University, San Luis Obispo. Candidates must have a Ph.D. in computer science or a related area and demonstrate excellence in research and teaching. The University is an Equal Opportunity/Affirmative Action employer and women, minorities, and persons with disabilities are encouraged to apply.

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT
THE UNIVERSITY OF TEXAS AT ARLINGTON
The University of Texas at Arlington (UTA), Computer Science and Engineering, invites applications for a faculty position at the rank of Assistant Professor at the Department of Computer Science and Engineering. The appointment is expected to start in Fall 2002. These positions are filled. EOE/AA/IRCA/ADA.

Clemson University
Faculty Positions
Computer Science
Clemson University has multiple openings for tenure-track faculty positions at all levels as well as lecturers. Outstanding candidates in all areas of Computing are encouraged to apply. Current faculty interests include algorithms and theory, computer architecture and computer systems, databases and data mining, computer security, visualization, networking and systems, programming languages, and software engineering. A Ph.D. in computer science or a related area is required. Women, minority members, and applicants from underrepresented groups are encouraged to apply.

Brown University
Division of Science and Engineering
The Division of Science and Engineering is seeking to fill three tenure-track faculty positions beginning mid-August, 2002. A Ph.D. in Computer Science is required. The Department is seeking candidates with a commitment to excellence in teaching and research who have demonstrated an active research program and a commitment to teaching excellence. The Department is committed to the highest standards for instruction and research. Applicants should send a CV and three letters of recommendation to: Prof. Klara Kedem, Chair, Division of Science and Engineering, Brown University, Providence, RI 02912. T41, Tranhahrain@brown.edu. An open search will be conducted to determine the best person to fill each position. Brown University is an Affirmative Action/Equal Opportunity Employer and women, minorities, and protected persons are encouraged to apply.

COMPUTER SCIENCE AND ENGINEERING
THE UNIVERSITY OF TEXAS AT ARLINGTON
The Division of Engineering at the University of Texas at Arlington invites applications for a faculty position at the rank of Assistant Professor at the Department of Computer Science and Engineering. The appointment is expected to start in Fall 2002. These positions are filled. EOE/AA/IRCA/ADA.

College of Charleston
A search committee for the Department of Computer Science at the College of Charleston is seeking candidates for a faculty position at the rank of Assistant Professor. Applicants should have a Ph.D. in computer science or a related area and demonstrate excellence in research and teaching. The Department is committed to the highest standards for instruction and research. The University has an enrollment of approximately 2200 students. Women, minority members, and applicants from underrepresented groups are encouraged to apply.

Candace Forbes Endowed Professor
Brown University seeks applications for a position at the Professor level in the Department of Computer Science. Brown University is a world-renowned private institution known for excellence in research and teaching, with a flourishing industrial base and excellent opportunities for industry/university collaboration. At the time of appointment, candidates are expected to have a Ph.D. in Computer Science, or a closely related field, and a record of achievement in research that is nationally recognized with the goal of reaching a national top 25 ranking. The initiative is strongly supported by all CSE/UTA stakeholders including the UTA administration, our students and alumni, and our industry partners. The highlights of the Top 25 Initiative include significant increase in tenure track faculty positions and Ph.D. students; significant increase in research funds; and establishment of endowed student fellowships, endowed faculty chairs, and endowed sponsored laboratories.

Brown University
Division of Science and Engineering
Faculty Position in Computer Engineering
The Division of Engineering at Brown University announces a tenure-track or tenured faculty position in Computer Engineering. The appointment in the area of Computer Networking. Areas of special interest include computer networks, programming languages, and operating systems. A Ph.D. in computer science or a related area and demonstrated excellence in research and teaching are required. Women, minority members, and applicants from underrepresented groups are encouraged to apply.

Columbia University
The Department of Computer Science at Columbia University has multiple openings for tenure-track faculty positions at all levels as well as lecturers. Outstanding candidates in all areas of Computer Science are encouraged to apply. Current faculty interests include algorithms and theory, computer architecture and computer systems, databases and data mining, computer security, visualization, networking and systems, programming languages, and software engineering. A Ph.D. in computer science or a related area is required. Women, minority members, and applicants from underrepresented groups are encouraged to apply.

CUNY Graduate Center
The Department of Computer Science at the Graduate Center of The City University of New York invites applications for a tenure-track position at the Assistant or Associate Professor level. The position is open in the area of computer science. The appointment is expected to start in Fall 2002. These positions are filled. EOE/AA/IRCA/ADA.

Columbia University
The College of Engineering at Columbia University invites applications for a full-time, tenure-track faculty position at the rank of Assistant Professor. Applications are invited for a tenure-track position at the rank of Assistant Professor. Candidates are expected to have a Ph.D. in computer science or a related area and demonstrate excellence in research and teaching. Women, minority members, and applicants from underrepresented groups are encouraged to apply.
to teaching excellence, and strong written and verbal communication skills. The appointments include student advising, curriculum development, scholarly activity, committee service, and other duties. Applicants should send a letter of application, vita with copies of graduate transcripts, a statement addressing the applicant's teaching and scholarly research, a teaching statement, and a list of at least four references to: Professor Richard A. Davis, Chair Faculty Search Committee College of Natural Sciences 601 South Howes, Room 211 Colorado State University Fort Collins, Colorado 80523 Screening of applications will begin November 19, 2001 and will continue until the position is filled. Questions and inquiries can be sent via e-mail to chair@cs.colostate.edu. Colorado State University is an EEO/A Affirmative Action employer and encourages applications from women and members of minority groups.

DePaul University
School of Computer Science, Telecommunications and Information Systems

Tenure-track Full-time Faculty Positions

The School of Computer Science, Telecommunications and Information Systems (CTI) of DePaul University invites applicants for multiple tenure-track positions beginning September 2002. We welcome applications from outstanding candidates with strong organizations in computer science and related areas. The position will be located at DePaul University's new, dedicated building. Faculty members will be expected to continue their research and teaching in this new facility.

We are particularly interested in applicants with expertise in areas of specialization. CTI is a young and growing school in downtown Chicago, with a national and international reputation in computer science and related areas.

Faculty positions are open in the areas of computer science, telecommunications, and information systems. We are broadly interested in these areas and encourage applications from qualified candidates with a Ph.D. in computer science or related fields.

In order to be considered for the position, applicants must have completed all requirements for the Ph.D. degree or its equivalent by the date of appointment. Preference will be given to candidates with experience in high-speed networking, Internet environments and applications, operating systems and architecture, distributed computing and networking, systems and security, and artificial intelligence.

Applicants should send a curriculum vitae and letters of reference to:

Professor Richard A. Davis, Chair Faculty Search Committee College of Natural Sciences 601 South Howes, Room 211 Chicago, IL 60604-2301 E-mail: faculty_search@cti.depaul.edu

Review of applications will begin immediately and continue until the position is filled. In accordance with DePaul's equal opportunity policy, preference will be given to candidates from underrepresented groups.

DePaul University is a Affirmative Action employer and encourages applications from women and members of minority groups.

Sponsored by: Faculty Search Committee

Dartmouth College

Department of Computer Science

Faculty Position in Computer Science

The Department of Computer Science anticipates hiring one or more faculty members to begin in September 2002. The position is available immediately and will continue until the search is completed. Please send application material as electronic files to:

Professor Donald Lowell
Chair, Computer Science Recruiting Committee Dartmouth College 6211 Southwards Avenue Hanover, NH 03755-3510 E-mail: dlowell@cs.dartmouth.edu

All evaluations will be sent to email address requested by the applicant.

The faculty position is a full-time, tenure-track position with an initial term of appointment of five years. The position is a full-time, tenure-track position with an initial term of appointment of five years. The position is available immediately and will continue until the search is completed.

The faculty member will be expected to continue their research and teaching in the new computer science building.

The Department of Computer Science at Dartmouth College is a diverse and dynamic department with a growing faculty and student body. The department offers a strong undergraduate program in computer science and a graduate program in computer science, including the Ph.D. degree in computer science.

The department is committed to excellence in teaching and research and actively seeks candidates with a commitment to research and teaching.

The position will begin in September 2002. Preference will be given to candidates from underrepresented groups.

We welcome applications from outstanding candidates with strong organizations in computer science and related areas. We are broadly interested in these areas and encourage applications from qualified candidates with a Ph.D. in computer science or related fields.

Applicants should send a curriculum vitae and letters of reference to:

Professor Donald Lowell, Chair, Computer Science Recruiting Committee Dartmouth College 6211 Southwards Avenue Hanover, NH 03755-3510 E-mail: dlowell@cs.dartmouth.edu

Applications will be considered until the position is filled.

Dartmouth College is an Affirmative Action employer and encourages applications from women and members of minority groups.

Duke University

Department of Computer Science

 Faculty Position in Computer Science

The Department of Computer Science at Duke University, to start

We are particularly interested in candidates in the areas of computing, networking, and security. Faculty members will be expected to continue their research and teaching in the new computer science building.

The position will begin in September 2002. Preference will be given to candidates from underrepresented groups.

We welcome applications from outstanding candidates with strong organizations in computer science and related areas. We are broadly interested in these areas and encourage applications from qualified candidates with a Ph.D. in computer science or related fields.

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Professorial Opportunities

AcallingshouldbeaddressedinhardcopyorinPDFformat.Localstakeholderswillretainstrongcommitmenttoactivelyinvolvingundergraduateandgraduatestudentsinresearchandteachingactivitysinoneallargeandsmallcourses.EmoryUniversity

TheDepartmentofComputerScienceatGeorgiaInstituteofTechnology(GeorgiaTech)isseekingcandidatesforafullprofessorrankincomputerengineering.


Applicantsmusthavedemonstratedabilitytocconductresearchleadingtoadefinitelinesoitcanbechangedwithinafewyears.EmoryUniversity

FacultySearchChair

Dr.MustaqueAhamad,Co-Chair

Phone:(404)894-9846

Fax:(404)894-9846

Email:recruiting@cc.gatech.edu

GeorgiaTechisathoughtfulacademicinstituteknownforitscommitmenttoacademicexcellence.EmoryUniversity

Forfurtherinformation,pleasevisithttp://www.cc.gatech.edu.

ArtificialIntelligence

ComputerSystemSecurity

ComputerNetworks

ComputerArchitecture

ComputationalGeometry

DatabaseManagement

ImageProcessing

Networking

OperatingSystems

ScientificComputing

SoftwareEngineering

ComputerScience

SchoolofComputing

GeorgiaTech

Gtlanc@gmail.com

Phone:(404)894-8257

Fax:(404)894-8288

Heartland

Email:recruiting@cse.gatech.edu

1123GuineaStreetBldg.

GeorgiaTech

Company

1123GuineaStreetBldg.

GeorgiaTech

1123GuineaStreetBldg.

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GeorgiaTech
Johns Hopkins University has announced the availability of positions in the Department of Computer Science, including tenure-track faculty positions. The university is seeking candidates who can contribute to the academic and research programs of the department, which includes areas such as computer science, electrical engineering, and robotics. Applicants are encouraged to submit complete applications as soon as possible, but full consideration will be given until all positions are filled. Additional information can be obtained by contacting apply@cs.jhu.edu. The Johns Hopkins University is an Equal Opportunity/Affirmative Action/Minority/Female/Disabled/Veteran/Sexual Orientation/Gender Identity Employer.

Michigan State University has advertised openings in the Department of Computer Science and Engineering, the Department of Computing and Information Sciences, and the Department of Telecommunications. The positions are aimed at candidates with experience in computer science, electrical engineering, and related fields. Applications are encouraged by January 15, 2002, for full consideration. More information can be obtained by contacting the Department of Computing and Information Sciences at 517-353-3402.

Michigan State University is an Equal Opportunity/Affirmative Action/Minority/Disabled/Veteran Employer.

Michigan State University is seeking faculty members in the Department of Computing and Information Sciences. Applications are encouraged by January 15, 2002, for full consideration. More information can be obtained by contacting the Department of Computing and Information Sciences at 517-353-3402.

Michigan State University is a Title VI-Affirmative Action/Equal Opportunity Institution.

National Science Foundation, Division of Computing and Information Science, Office of Cyberinfrastructure, solicits proposals for support of advanced cyberinfrastructure. Applications are encouraged by January 31, 2002. More information can be obtained by contacting the Office of Cyberinfrastructure at 703-292-8044.

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North Carolina State University

Department of Computer Science

College of Management, Department of Business Administration

The Department of Computer Science seeks one or more tenure-track assistant professors in the area of networking research. The application deadline is January 10, 2002. To ensure full consideration, applications should include a resume, a statement of career objectives, key publications, and the names and references of at least four faculty members interested in the applicant’s work. The department occupies substantial space on the North Carolina State University campus, an advanced technology campus, the State of North Carolina, the successful candidate is expected to hold or be completing a Ph.D. in a closely related field, and demonstrated potential to establish a strong research and teaching program at NCSU. Candidates are expected to have both strong research and teaching interests in the areas in database systems research and education. The new faculty member will have a collegial and collaborative environment, opportunities for collaboration on campus, and with local industry. The applications should contact the Computer Science Department at (919) 515-3090. North Carolina State University

Department of Computer Science

Checkman and Chev particular interest in the field of computer science. The successful candidate will have a PhD in Computer Science or a field related to computer science, and an extensive research record.

The Department of Computer Science at North Carolina State University seeks one or more tenure-track assistant professor in the area of software engineering. The application deadline is January 10, 2002. To ensure full consideration, applications should include a resume, a statement of career objectives, key publications, and the names and references of at least four faculty members interested in the applicant’s work. The department occupies substantial space on the North Carolina State University campus, an advanced technology campus, the State of North Carolina, the successful candidate is expected to hold or be completing a Ph.D. in a closely related field, and demonstrated potential to establish a strong research and teaching program at NCSU. Candidates are expected to have both strong research and teaching interests in the areas of database systems research and education. The new faculty member will have a collegial and collaborative environment, opportunities for collaboration on campus, and with local industry. The applications should contact the Computer Science Department at (919) 515-3090.

North Carolina State University

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Professional Opportunities

Filled. For additional information please see http://www.cs.pomona.edu.

The Ohio State University is an Equal Opportunity, Affirmative Action Employer. Women, minorities, and individuals with disabilities are encouraged to apply.

Panasonic
Panasonic is a leader in the development of digital systems and products. In this growing group, you will be in charge of managing a series of facilities like our Princeton, NJ based Panasonic Research Laboratories or our Panasonic Engineering Technologies Laboratory. Our center is involved in developing a series of software platforms for the ubiquitous networking world and these are opportunities available.

Office of the Provost, The City College of New York: Code 4255
Work towards creating the operating sys-
tems and/or microkernels is a plus. IP
platforms for the ubiquitously networked
world is another opportunity available.

Pomona College

Department of Computer Science

Tenure-track assistant professorship, begin-
ing in fall 2002.

The Department of Computer Science at
Pomona College is an equal opportunity
employer that encourages applications from women and
members of under-represented groups. Pomona College supports
research and requires a strong commitment to teaching.

Further information from:

c_schremers@pomona.edu

Purdue University

Department of Computer Sciences

Tenure-Track Positions

Purdue University invites applications for the following positions beginning August 2001.

At least two assistant professor positions are available for highly qualified applicants. A Ph.D. in computer science or a closely related field is required. A strong commitment to teaching and research in the computing discipline is expected. Evidence of teaching ability is required.

Applicants should send curriculum vita, statements of research and teaching interests, and names of four references to:

It is expected that research work will be performed in the areas of computer science, and applicants are expected to be interested in teaching opportunities.

Applications are encouraged from women and members of under-represented groups.

Pomona College invites applications from women and members of under-represented groups.

Pomona College is an equal opportunity employer that encourages applications from women and members of under-represented groups.

For more information about the

Pomona College

Computer Science Department, please visit the website at

http://www.cs.pomona.edu

Robert A. Coehlo, Chair

Department of Computer Science

Pomona College

February 17, 2002

University of Buffalo, The State University of New York

Faculty Positions in Computer Science

The Department of Computer Science and Engineering (CSE) has faculty openings at all levels. Candidates in all areas of computer science can be considered. Women and minorities are especially encouraged to apply.

We especially seek applicants who will contribute to creating a high-quality, high-performance computing, multimedia, graphics, networking, and vision research center at CSE. Applicants who have demonstrated high-quality publications and have demonstrated potential to attract research funding in any area of computer science will be considered. Close ties with other disciplines, including psychology, are encouraged.

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opportunity employer committed to diversity. This position is part of the Department of Research and Teaching interest, a complete resume, teaching and research interests, and letters of recommendation by email to: Faculty Search Committee Department of Computer Science Texas A&M University, College Station, TX 77843-3112. A applications will be accepted until the position is filled.

Texas A&M University
Department of Computer Science
College Station, TX 77843-3112

A senior faculty position is available immediately in the Department of Computer Science at Texas A&M University. The person hired for this position will co-direct the Embedded Systems Laboratory with Professor Timothy Moscibroda. The position is open to candidates with a Ph.D. in Computer Science with a strong research commitment to the area of embedded systems. The successful candidate will have a demonstrated commitment to excellence in research and teaching, and be able to collaborate with other faculty members in the area of embedded systems. The position is available immediately and will be open until filled. Applications should be sent to: Faculty Search Committee Department of Computer Science Texas A&M University, College Station, TX 77843-3112. Applications from minority and women candidates are encouraged.

The University of Arizona
Department of Computer Science
1001 N.ondia, Tucson, AZ 85721-0077

The Computer Science Department at the University of Arizona invites applications for a faculty position at the level of Assistant or Associate Professor. The position is available immediately. The successful candidate will have a strong research and teaching commitment to the area of software engineering. The successful candidate will be expected to develop and maintain an active research program, and to contribute to the teaching mission of the department. Salary is commensurate with experience and qualifications. Applications should be sent to: The University of Arizona Faculty Recruiting Committee Department of Computer Science University of Arizona Tucson, AZ 85721-0077. In addition the preferred qualifications should include a strong record of peer-reviewed publications, with strong expertise in software engineering. Applications should be submitted by: December 1, 2001.

The University of California, Irvine
Department of Computer Science
1 computer Science, Irvine, CA 92697-3425

The Department of Computer Science at the University of California, Irvine invites applications for a faculty position at the level of Assistant or Associate Professor. The position is available immediately. The successful candidate will have a strong research and teaching commitment to the area of software engineering. The successful candidate will be expected to develop and maintain an active research program, and to contribute to the teaching mission of the department. Salary is commensurate with experience and qualifications. Applications should be sent to: The University of California, Irvine Faculty Recruiting Committee Department of Computer Science University of California, Irvine Irvine, CA 92697-3425. In addition the preferred qualifications should include a strong record of peer-reviewed publications, with strong expertise in software engineering. Applications should be submitted by: December 1, 2001.

The University of California, Los Angeles
Department of Computer Science
http://www.cs.ucla.edu

The Department of Computer Science at the University of California, Los Angeles invites applications for a faculty position at the level of Assistant or Associate Professor. The position is available immediately. The successful candidate will have a strong research and teaching commitment to the area of software engineering. The successful candidate will be expected to develop and maintain an active research program, and to contribute to the teaching mission of the department. Salary is commensurate with experience and qualifications. Applications should be sent to: The University of California, Los Angeles Faculty Recruiting Committee Department of Computer Science University of California, Los Angeles Los Angeles, CA 90095-1596. In addition the preferred qualifications should include a strong record of peer-reviewed publications, with strong expertise in software engineering. Applications should be submitted by: December 1, 2001.

The University of California, Riverside
Department of Computer Science
http://www.cs.ucr.edu

The Department of Computer Science at the University of California, Riverside invites applications for a faculty position at the level of Assistant or Associate Professor. The position is available immediately. The successful candidate will have a strong research and teaching commitment to the area of software engineering. The successful candidate will be expected to develop and maintain an active research program, and to contribute to the teaching mission of the department. Salary is commensurate with experience and qualifications. Applications should be sent to: The University of California, Riverside Faculty Recruiting Committee Department of Computer Science University of California, Riverside Riverside, CA 92521-0407. In addition the preferred qualifications should include a strong record of peer-reviewed publications, with strong expertise in software engineering. Applications should be submitted by: December 1, 2001.

The University of California, Santa Barbara
Department of Computer Science
http://www.cs.ucsb.edu

The Department of Computer Science at the University of California, Santa Barbara invites applications for a faculty position at the level of Assistant or Associate Professor. The position is available immediately. The successful candidate will have a strong research and teaching commitment to the area of software engineering. The successful candidate will be expected to develop and maintain an active research program, and to contribute to the teaching mission of the department. Salary is commensurate with experience and qualifications. Applications should be sent to: The University of California, Santa Barbara Faculty Recruiting Committee Department of Computer Science University of California, Santa Barbara Santa Barbara, CA 93106-5050. In addition the preferred qualifications should include a strong record of peer-reviewed publications, with strong expertise in software engineering. Applications should be submitted by: December 1, 2001.

The University of Southern California
Department of Computer Science
http://www.cs.usc.edu

The Department of Computer Science at the University of Southern California invites applications for a faculty position at the level of Assistant or Associate Professor. The position is available immediately. The successful candidate will have a strong research and teaching commitment to the area of software engineering. The successful candidate will be expected to develop and maintain an active research program, and to contribute to the teaching mission of the department. Salary is commensurate with experience and qualifications. Applications should be sent to: The University of Southern California Faculty Recruiting Committee Department of Computer Science University of Southern California Los Angeles, CA 90089-1271. In addition the preferred qualifications should include a strong record of peer-reviewed publications, with strong expertise in software engineering. Applications should be submitted by: December 1, 2001.

The University of Washington
Department of Computer Science
http://www.cs.washington.edu

The Department of Computer Science at the University of Washington invites applications for a faculty position at the level of Assistant or Associate Professor. The position is available immediately. The successful candidate will have a strong research and teaching commitment to the area of software engineering. The successful candidate will be expected to develop and maintain an active research program, and to contribute to the teaching mission of the department. Salary is commensurate with experience and qualifications. Applications should be sent to: The University of Washington Faculty Recruiting Committee Department of Computer Science University of Washington Seattle, WA 98195-1585. In addition the preferred qualifications should include a strong record of peer-reviewed publications, with strong expertise in software engineering. Applications should be submitted by: December 1, 2001.

The University of Wisconsin-Madison
Department of Computer Sciences
http://www.cs.wisc.edu

The Department of Computer Sciences at the University of Wisconsin-Madison invites applications for a faculty position at the level of Assistant or Associate Professor. The position is available immediately. The successful candidate will have a strong research and teaching commitment to the area of software engineering. The successful candidate will be expected to develop and maintain an active research program, and to contribute to the teaching mission of the department. Salary is commensurate with experience and qualifications. Applications should be sent to: The University of Wisconsin-Madison Faculty Recruiting Committee Department of Computer Sciences University of Wisconsin-Madison Madison, WI 53706-1585. In addition the preferred qualifications should include a strong record of peer-reviewed publications, with strong expertise in software engineering. Applications should be submitted by: December 1, 2001.

The University of Wyoming
Department of Computer Science
http://www.cs.uwyo.edu

The Department of Computer Science at the University of Wyoming invites applications for a faculty position at the level of Assistant or Associate Professor. The position is available immediately. The successful candidate will have a strong research and teaching commitment to the area of software engineering. The successful candidate will be expected to develop and maintain an active research program, and to contribute to the teaching mission of the department. Salary is commensurate with experience and qualifications. Applications should be sent to: The University of Wyoming Faculty Recruiting Committee Department of Computer Science University of Wyoming Laramie, WY 82071-3030. In addition the preferred qualifications should include a strong record of peer-reviewed publications, with strong expertise in software engineering. Applications should be submitted by: December 1, 2001.
University of California, San Diego
Senior Faculty Position at Supercomputer Center
(SDSC)

The Department of Electrical & Computer Engineering (ECE) at the University of California, San Diego invites applications for multiple faculty positions at the Assistant, Associate, or Full Professor level. This search process is being carried out in conjunction with the recruitment for the leadership of the Supercomputer Center (SDSC), a national leader in computational science and engineering. The SDSC Director's search is now underway. The compensation and benefits to be offered to candidates in both the Supercomputer Center and the University will be commensurate with appointment rank.

The ECE Department is in the College of Engineering at the University of California, San Diego. The Department has 16 tenure-track and 3 tenured faculty members, and has full-time enrollments of 110 undergraduates and 90 graduate students. The faculty has an active research program in areas including distributed computing, parallel and distributed computing, supercomputer architecture, high-level languages as well as storage systems and networked storage, with an emphasis on collaboration with highly qualified and motivated faculty members in the Computer and Electrical Engineering programs. The Department has strong research and education collaboration with highly qualified and motivated faculty members in the College of Engineering. The Department of Electrical & Computer Engineering enjoys a synergistic relationship with the College of Engineering.

The University of California enjoys a synergistic relationship with the College of Engineering. The College of Engineering enjoys a synergistic relationship with the University of California, San Diego. The University of California, San Diego is located on the northwest section of San Diego Bay, where the University is surrounded by beaches, parks, and other attractions. The City of San Diego is known for its mild climate and is one of the most livable cities in the United States. It is located about 20 miles from Los Angeles, and offers easy access to the Southern California theme parks, attractions, and activities, shopping, and other attractions. The position is expected to begin Fall 2002. Outstanding candidates for the 21st century.

The ECE Department is staffed with 17 faculty members, and has full-time enrollments of 110 undergraduates and 90 graduate students. The faculty has an active research program in areas including distributed computing, parallel and distributed computing, supercomputer architecture, high-level languages as well as storage systems and networked storage, with an emphasis on collaboration with highly qualified and motivated faculty members in the Computer and Electrical Engineering programs. The Department has strong research and education collaboration with highly qualified and motivated faculty members in the College of Engineering. The Department of Electrical & Computer Engineering enjoys a synergistic relationship with the College of Engineering.

The University of California, San Diego is located on the northwest section of San Diego Bay, where the University is surrounded by beaches, parks, and other attractions. The City of San Diego is known for its mild climate and is one of the most livable cities in the United States. It is located about 20 miles from Los Angeles, and offers easy access to the Southern California theme parks, attractions, and activities, shopping, and other attractions. The position is expected to begin Fall 2002. Outstanding candidates for the 21st century.
The University of Georgia
Department of Computer Science

Faculty Positions; Graduate Fellowships

The University of Georgia, founded in 1785, is the state's largest institution of higher education and one of the largest public universities in the nation. The University is located near downtown Athens, a charming and historic university town of 100,000, approximately 65 miles from metropolitan Atlanta, with mild winters and pleasant summers. Athens boasts a major Performing Arts Center, the University's own railroad station, and easy access to Atlanta's sports venues. It is a Doctoral I university. Approximately 25,000 students are enrolled, 14,000 of whom are undergraduates, with another 6,500 in graduate programs. The University has access to significant high-end computing resources and employs about 1,800 faculty and staff.

The Department of Computer Science is committed to excellence in both research and instruction and offers BS, MS, and Ph.D. degrees. In August 2000, the Department moved into a new building, the $52 million School of Computing. The School is housed in a five-story building with over 200,000 square feet of instructional and research facilities, and offers education and research in computer science, computer engineering, and information technology.

The Department is growing, and currently has 31 faculty members and 219 graduate students. It has one of the most active research programs in the region, with annual research expenditures of over $4 million. The Department supports 34 graduate and 49 undergraduate research assistants. It has four national and two local NRC award winners on its faculty. The Department offers the Master's Degree in Computer Science and Engineering Research is required for the position.

Applications for one or two positions will be accepted until the positions are filled. The University is an equal opportunity, affirmative action employer

University of Illinois at Chicago
Department of Computer Science

Faculty Search Committee Chairman

The University of Illinois at Chicago is a major research university with over 25,000 students. It is one of the largest urban universities in the nation and the largest urban university in the state of Illinois. The University is located in a thriving, urban community near Lake Michigan. The city is approximately 120 miles west of Chicago. The University is committed to excellence in both research and instruction.

The department is home to over 200 faculty and staff members, including 55 visiting faculty and 15 faculty members who are funded by the National Science Foundation, the National Institutes of Health, and other federal agencies. The department has an active research program and has received over $8 million in research grants in the past five years. The department is also home to the Center for Bioinformatics and Computational Biology, which is one of the largest bioinformatics centers in the world.

The University of Illinois at Chicago is an equal opportunity/affirmative action employer, and especially encourages applications from women and minorities.

University of Illinois at Chicago
Department of Computer Science

Faculty Positions

The University of Illinois at Chicago is a major urban university in the Chicago metropolitan area. The University is the home of a growing computer science department with over 250 graduate students. The department is one of the largest in the country and is committed to excellence in both research and instruction. The department offers BS, MS, and Ph.D. degrees in computer science.

The University of Illinois at Chicago is an equal opportunity/affirmative action employer, and especially encourages applications from women and minorities.

University of Louisiana at Lafayette

Computational Biology

The Center for Advanced Computer Studies is a growing, departmental-size research unit, of 15 faculty, with programs in selected areas of computational biology. The Center is dedicated to the development and application of computational methods to problems in biology, medicine, and other sciences.

The Center for Advanced Computer Studies has a strong commitment to teaching and research and offers BS, MS, and Ph.D. degrees in computer science. The Center has a strong research program and has received over $8 million in research grants in the past five years. The Center is also home to the Center for Bioinformatics and Computational Biology, which is one of the largest bioinformatics centers in the world.

The University of Louisiana at Lafayette is an equal opportunity/affirmative action employer, and especially encourages applications from women and minorities.
University of Miami
Department of Computer Science
New tenure-track faculty positions
The Department of Computer Science at the University of Miami has grown steadily over the past several years and is poised to play a prominent role in the Digital University as well as a member of the next-generation computer science departments. The department is strongly committed to research and teaching and has an established record in research and technology companies in the area.

External research funding in the department has grown from $1.8 million in fiscal year 1999 to over $12 million in fiscal year 2001. Operational at the University in Spring 2002, the department houses over 800 undergraduate students and over 30 Ph.D. students. The University is located in the historic town of Oxford in the wooded hills of north Mississippi, ninety minutes drive from Memphis. Review of applications will begin immediately and will continue until the position is filled or an adequate applicant pool is established. The University is an equal opportunity/affirmative action employer, and encourages applications from women and minorities.

Applicants should send a letter of application, curriculum vitae, research statement, teaching statement, and three letters of recommendation to:

Victor Milenkovic, Department Chair
Faculty Search Committee, Department of Computer Science
University of Miami, P. O. Box 24314
University Station
Ann Arbor, MI 48109-2122

You may submit applications and inquiries via email to victor@miami.edu or via email to research@miami.edu. Further information of the University and the department is available at its World Wide Web site at www.cs.miami.edu.

The University of Miami offers an Equal Opportunity/Affirmative Action Employer.

University of Michigan, Ann Arbor
Department of Electrical Engineering and Computer Science
Computing and Information Science
Applications and nominations are solicited for the position of Chair of the Department of Computer Science and Engineering (CSE) at the University of Michigan. The CSE Department includes outstanding academic record, a strong emphasis on teaching and research. The candidate will be expected to contribute to the diverse activities of the department.

The University of Michigan is a Non-Discrimination/Affirmative Action Employer. Please send resume and names of three or more references to:

Professor John E. Laird, Assoc. Chair
Department of Electrical Engineering and Computer Science
University of Michigan
2150 Bonisteel
Ann Arbor, MI 48109-2222

You may submit applications and inquiries via email to cse@umich.edu or via a letter of application using the US mail.

University of Minnesota - Twin Cities
Department of Computer Science and Engineering
Faculty Positions
Applications and nominations are solicited for several tenure-track positions at the assistant professor level, but highly qualified candidates at higher ranks will also be considered. The University of Minnesota has an increasing national reputation for excellence in undergraduate and graduate education, teaching and research. Candidates at all ranks are expected to have outstanding research and excellent funding records. The successful candidate will show the desire to shape the future of this budding department. The successful candidate will have the opportunity to collaborate with exceptional schools.

Applicants should submit a curriculum vitae, a statement of research interests, and the names of at least three references to:

Chair, Faculty Recruiting Committee
Department of Computer Science and Engineering
University of M. I nnesota
419 Abbott Union Building
200 Union St. S., E.
Minneapolis, MN 55455

Applications will be reviewed beginning as soon as possible and will continue until the position is filled or an adequate applicant pool is established. The University of Minnesota is an equal opportunity/affirmative action employer and encourages applications from women and minorities.

University of Mississippi
Department of Computer and Information Science
Chair Position. The University of Mississippi invites applicants for the position of Chair of the Department of Computer and Information Science. The Chair will provide leadership and strategic direction for the instructional and research programs of the Department. The University of Mississippi in a major center for the computer science and a closely related field, evidence of excellence in teaching, and an established record of research accomplishment in one of the broader areas of computer science and information science, and be an active participant in the academic Department. The successful candidate will have the opportunity to collaborate with exceptional schools.

The successful candidate will be expected to develop a research program in various areas of computer science, including but not limited to theory of computation, programming languages, compiler design, and applications. The University of Mississippi has established several outstanding interdisciplinary and industrially funded research programs in computational intelligence, decision support, image processing, computer vision, pattern recognition, database, digital networking, networked computing architecture, parallel processing, robotics, and various other areas.

Please send a resume, a statement of teaching and research interests, and the names of three references to:

Chair, Department of Computer and Information Science
University of Mississippi, 237 Kinard Hall
University, MS 38677

Attention: Professor John Willbanks, Chair

Applications are invited for the Chair position for the Department of Computer and Information Science in the College of Liberal Arts and Sciences of The University of Mississippi. The position will be a full-time tenure-track appointment at the assistant professor level, but highly qualified candidates at higher ranks will also be considered. The University of Mississippi has an increasing national reputation for excellence in undergraduate and graduate education, teaching and research. Candidates at all ranks are expected to have outstanding research and excellent funding records. The successful candidate will show the desire to shape the future of this budding department. The successful candidate will have the opportunity to collaborate with exceptional schools.

Applicants should submit a curriculum vitae, a statement of research interests, and the names of at least three references to:

Chair, Faculty Recruiting Committee
Department of Computer Science and Engineering
University of M. I nnesota
419 Abbott Union Building
200 Union St. S., E.
Minneapolis, MN 55455

Applications will be reviewed beginning as soon as possible and will continue until the position is filled or an adequate applicant pool is established. The University of Minnesota is an equal opportunity/affirmative action employer and encourages applications from women and minorities.

University of Nebraska - Lincoln
Department of Computer Science and Engineering
The University of Nebraska - Lincoln (UNL) is an outstanding public research university with Carnegie I standing and membership in the Association of American Universities. The CSE Department offers BS, MS, and PhD degrees in computer science, and a strong commitment to research and graduate education. Candidates at all ranks are expected to have outstanding research and excellent funding records. The successful candidate will show the desire to shape the future of this budding department. The successful candidate will have the opportunity to collaborate with exceptional schools.

Applicants should submit a curriculum vitae, a statement of research interests, and the names of at least three references to:

Chair, Department of Computer and Information Science
University of Nebraska - Lincoln
PO Box 890804
Lincoln, NE 68583-0804

Applications are invited for the Chair position for the Department of Computer and Information Science in the College of Engineering at the University of Nebraska - Lincoln. Applications are encouraged from any area of specialization, including but not limited to theory of computation, database, digital networking, networked computing architecture, parallel processing, robotics, and various other areas.

The University of Nebraska - Lincoln (UNL) CSE Department is expanding its research mission and is seeking a Chair to be appointed as a tenured professor at the rank of Associate Professor. Candidates at higher ranks are also encouraged. The successful candidate will have the opportunity to collaborate with exceptional schools.

The Chair will provide leadership and strategic direction for the instructional and research programs of the Department. The application should be accompanied by the following:

• A letter of application indicating the candidate’s interest in the position
• A curriculum vitae
• A statement of teaching and research interests
• The names and addresses of at least three references

The Chair will provide leadership and strategic direction for the instructional and research programs of the Department. The successful candidate will show the desire to shape the future of this budding department. The successful candidate will have the opportunity to collaborate with exceptional schools.

Applications are invites for the Chair position for the Department of Computer and Information Science in the College of Engineering at the University of Nebraska - Lincoln. Applications are encouraged from any area of specialization, including but not limited to theory of computation, database, digital networking, networked computing architecture, parallel processing, robotics, and various other areas.

The Chair will provide leadership and strategic direction for the instructional and research programs of the Department. The successful candidate will show the desire to shape the future of this budding department. The successful candidate will have the opportunity to collaborate with exceptional schools.

Applications are invites for the Chair position for the Department of Computer and Information Science in the College of Engineering at the University of Nebraska - Lincoln. Applications are encouraged from any area of specialization, including but not limited to theory of computation, database, digital networking, networked computing architecture, parallel processing, robotics, and various other areas.

The Chair will provide leadership and strategic direction for the instructional and research programs of the Department. The successful candidate will show the desire to shape the future of this budding department. The successful candidate will have the opportunity to collaborate with exceptional schools.

Applications are invites for the Chair position for the Department of Computer and Information Science in the College of Engineering at the University of Nebraska - Lincoln. Applications are encouraged from any area of specialization, including but not limited to theory of computation, database, digital networking, networked computing architecture, parallel processing, robotics, and various other areas.

The Chair will provide leadership and strategic direction for the instructional and research programs of the Department. The successful candidate will show the desire to shape the future of this budding department. The successful candidate will have the opportunity to collaborate with exceptional schools.
Professional Opportunities

about the department can be found at http://www.cse.pitt.edu. The University of Pittsburgh is an Equal Opportunity/Affirmative Action employer.

University of Oregon

Computer and Information Science

The Department of Computer and Information Science at the University of Oregon invites applications for tenure-track faculty positions. Qualifications include a Ph.D. in Computer Science or equivalent. Applicants are expected to have a strong record of research, fund- ing history and national recognition. Junior professors are expected to have completed their Ph.D. in Computer Science or a related field and a post-doctoral fellowship. Interested persons should send an application letter, curriculum vitae, research interests, a statement of teaching philosophy, and three letters of recommendation to:

Dr. Janet L. Beery, Chair
Department of Computer and Information Science
University of Oregon
Eugene, OR 97403-1202

Applications will be accepted until positions are filled. The University of Oregon is an Equal Opportunity/Affirmative Action institution committed to diversity and excellence in the workplace. The University of Oregon is an AAU and ADA compliant institution.

University of Pennsylvania

Department of Computer and Information Science

Faculty Positions

The College of Engineering at the University of Pennsylvania invites applications for tenure-track appointments in both the Computer Science and Engineering Departments and the Biomedical Engineering Department.

The University of Pennsylvania is committed to excellence in all aspects of its academic mission. The University offers undergraduate and graduate programs in a wide range of disciplines and provides an excellent environment for research and teaching. The department offers a Ph.D. degree in computer science, a certificate program in computer engineering, and an M.S. degree in computer science. The department includes approximately 250 faculty members, including 90 tenure-track faculty members, and about 100 graduate students.

Applications are invited for up to 8 tenured or tenure-track appointments beginning with the academic year 2002-2003.

A Ph.D. degree in computer science, computer engineering, or a closely related field is required. Candidates are expected to maintain an active research program and to be effective teachers at both the undergraduate and graduate levels. The department is particularly interested in candidates with research interests in the following areas:

- Artificial Intelligence
- Computer Vision
- Computer Graphics
- Computer Networks
- Databases
- Information Retrieval
- Machine Learning
- Networking
- Programming Languages
- Robotics
- Software Engineering

Applications will be considered until the position is filled. For consideration, the application must be received by January 18, 2002. For further information, please contact:

Dr. Janet L. Beery, Chair
Department of Computer and Information Science
University of Oregon
Eugene, OR 97403-1202

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University of Pittsburgh

Department of Electrical and Computer Engineering

The University of Pittsburgh invites applications for assistant professor level, and tenured faculty positions open for Fall 2002. The Department of Electrical and Computer Engineering is an exciting, rapidly growing, diverse, and highly productive research and teaching unit that offers undergraduate and graduate programs in a wide range of disciplines.

Applications are invited for up to 8 tenured or tenure-track appointments beginning with the academic year 2002-2003. Candidates are expected to maintain an active research program and to be effective teachers at both the undergraduate and graduate levels. The department is particularly interested in candidates with research interests in the following areas:

- Artificial Intelligence
- Computer Vision
- Computer Graphics
- Computer Networks
- Databases
- Information Retrieval
- Machine Learning
- Networking
- Programming Languages
- Robotics
- Software Engineering

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The University of South Carolina
Department of Computer Science
Faculty Positions

The University of South Carolina, located in Columbia, SC, is a state-supported university with about 38,000 undergraduates and graduates. The Computer Science Department has a well-respected program in computer science, with faculty specializing in areas such as artificial intelligence, computer architecture, and distributed systems. The department is one of the top ten departments in the country in terms of research funding. The department is particularly strong in the areas of bioinformatics and data science. The department is committed to having a diverse and inclusive faculty and is actively recruiting candidates from underrepresented groups.

The University of South Carolina is an affirmative action/equal opportunity employer and is committed to diversity among its faculty.

Successful candidates will be expected to secure significant external funding and to provide a stimulating learning environment for undergraduate and graduate students.

Applications are invited for tenure-track faculty positions at all levels, including Assistant Professor, Associate Professor, and Professor. The Computer Science Department is seeking candidates with a strong research record and a commitment to teaching excellence. The department is particularly interested in candidates with expertise in areas such as bioinformatics, data science, and computer architecture.

Applications will be considered as soon as they are complete. The search will remain open until positions are filled. For more information, please contact the Chair of the Computer Science Department at cse-dean@cs.columbia.edu. Applicants should send a letter of application, curriculum vitae, and three references to: Chair of the Computer Science Department, University of South Carolina, 103 Martin Hall, Columbia, SC 29208-0160.

Applications are also welcome for a joint position in the North Carolina Bioinformatics Institute (NBI) at North Carolina State University, with a significant focus in bioinformatics. The NBI is a state-funded research institute that focuses on the development and application of computational methods to solve problems in biology. The NBI is located in the Research Triangle Park, which is a hub for biotechnology and genomics research. The Department of Computer Science at North Carolina State University has a strong history of collaboration with the NBI, and the joint position offers a unique opportunity to work on cutting-edge research in bioinformatics.

Applications should be submitted to: Chair, North Carolina Bioinformatics Institute, 2230 Mailbox, Raleigh, NC 27695-8212. For more information, please visit the NBI website at http://www.ncbi.nlm.nih.gov.

The University of South Carolina is an equal opportunity employer and is committed to diversity and inclusion in all areas of its mission.

The University of South Carolina is an affirmative action/equal opportunity employer and is committed to diversity among its faculty.

Applications are invited for tenure-track faculty positions at all levels, including Assistant Professor, Associate Professor, and Professor. The Computer Science Department is seeking candidates with a strong research record and a commitment to teaching excellence. The department is particularly interested in candidates with expertise in areas such as bioinformatics, data science, and computer architecture.

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Professional Opportunities

Wayne State University
Department of Computer Science
Faculty Positions

The Department of Computer Science at Wayne State University invites applications for several tenure-track faculty positions at all levels. All areas of computer science will be considered. Candidates will be expected to continue their prior research and teaching. Applicants with a Ph.D. in computer science, engineering or a closely related field, and the potential for both research and teaching, a publication record and some potential for obtaining external funding, are encouraged to apply. Wayne State University is an equal opportunity/affirmative action employer.

Wayne State University is located in one of the major urban areas of the United States, an inviting residential community that places unusually strong commitment to teaching. Wayne State University is a Carnegie I urban research university serving over 23,000 students. The Department of Computer Science at Wayne State University is three courses per academic year. Wayne State University is an equal opportunity/affirmative action employer.

Wayne State University
Department of Mathematics and Computer Science

The Department of Mathematics and Computer Science at Wesleyan University is seeking to fill a tenure-track computer science position at the assistant professor level. The position will commence in the fall of 2003. For further information about the university see the WP and the Computer Science Department web-site (www.cs.wesleyan.edu). The WP Computer Science program is committed to teaching load with a liberal arts education. The department of computer science offers B.S., M.S. and Ph.D. degrees. Computer Science at Wesleyan University is a Carnegie II urban research university serving over 2,000 students. The WP Computer Science program is committed to teaching load with a liberal arts education.

Wesleyan University
Department of Mathematics and Computer Science

The Department of Mathematics and Computer Science at Wesleyan University is seeking to fill a tenure-track computer science position at the assistant professor level. The position will commence in the fall of 2003. For further information about the university see the WP and the Computer Science Department web-site (www.cs.wesleyan.edu). The WP Computer Science program is committed to teaching load with a liberal arts education. The department of computer science offers B.S., M.S. and Ph.D. degrees. Computer Science at Wesleyan University is a Carnegie II urban research university serving over 2,000 students. The WP Computer Science program is committed to teaching load with a liberal arts education.

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Computing Research Association

Best Practices Memo

Commercialization Oversight for Computer Research Departments

Summary

The relentless pressure to innovate in the information technology (IT) industry has drawn university researchers and graduate students into entrepreneurial situations to an increasing degree. The trend affects the academic enterprise in diverse ways, both favorable and unfavorable. The risks and rewards of commercialization and the concept of a departmental business incubator.

Commercialization Oversight for Computer Research Departments

The existence of the CO Committee is perhaps most critical to graduate students whose closest academic confidant may be their advisor, a person who will have a competing interest. They are governed by guidelines, policies, and laws designed to circumvent conflicts of interest.

Principles of Commercialization Oversight

A commercialization oversight activity is founded on two basic principles. Although these principles have been adopted at a number of universities, they are perhaps articulated best in the University of California's documentation.

1. Primacy of the University. The University of California states this principle clearly in its Guidelines on University-Industry Relations: "First consideration must be given to the University's mission of teaching, research, and public service. In pursuing relationships with industry, the University must retain the public trust and maintain institutional independence and integrity to permit faculty and students to pursue learning and research freely."

2. Responsible Behavior. The academic participants in a commercialization activity are typically the creators of the IP, the faculty and graduate student advisors, and the administrators of the institution, the university. They are governed by guidelines, policies, and laws designed to circumscribe and define acceptable behavior. The burden of acting legally, ethically, and responsibly relatively to these constraints falls to the inventors and the university. Independence is essential to the process if the institution is to preserve academic freedom. As the University of California's Statement On Conflicts of Interest points out, "A codification of the complex ethical questions involved, even if possible, would be unduly restrictive."

In addition to these two principles, the commercial oversight concept is based on the premise that it is an internal—that is, a departmental—responsibility. The inventors are members of the department, and any ill effects of commercialization will have an impact on the students and faculty. Further, situations in which a graduate student is exploited or a faculty member creates a conflict is even more evident at the departmental level. They are invisible at the school, college, or university level. So oversight is a departmental responsibility.

Role of Commercialization Oversight

From the two principles outlined above, it is evident that the role of the CO Committee is not to enforce regulations, but to facilitate high standards in order to preserve collegiality. Although there are many ways to do this, the CO activity will likely fulfill four basic functions:

1. Serving as a focal point for commercialization information.
2. Vigilance on behalf of the student-faculty relationship.
3. Vigilance on behalf of the faculty-faculty relationship.
4. Periodic review of commercialization activity.

These functions can be fulfilled by groups of one to several people, but a committee of two neutral senior faculty offers the advantage of providing multiple points of view, possibly, some wisdom. In this case, 'neutral' means that the faculty are not themselves involved in commercialization activities that would be of concern to the committee. (Consulting is not typically an issue for this committee.) It is appropriate, and possibly advantageous, if the members have had previous commercialization experience. The goal is to ensure independent judgment, both in appearance and in fact.

Focal Point. It is likely that many faculty members proceed through their careers, oblivious to university policies on commercialization and unaware of their obligations under federal laws such as the Bayh-Dole Act. Graduate students are even less well informed. Then one day they realize their research efforts have produced IP of commercial value. The CO Committee can serve as a neutral source of information or, more typically, can direct inventors to campus resources related to technology transfer.

The existence of the CO Committee is perhaps most critical to graduate students whose closest academic confidant may be their advisor, a person who will have a competing interest, and the administrators of the institution, the university. They are governed by guidelines, policies, and laws designed to circumvent conflicts of interest. Although commercialization situations are generally very different from one another—which is why the process cannot be so easily codified—experience always teaches lessons. Mistakes should not be repeated, and success should be.

Vigilance on Behalf of the Student-Faculty Relationship. There are several aspects of the student-faculty relationship with which the CO Committee should be concerned:

1. The advisor/advisee role.
2. The faculty/student economic standing.
3. The faculty/student job performance.

Advisor/Advice. Although faculty and graduate students may be equals in the creation of IP, they are not as "economic individuals," they are not equals in their academic relationships. The graduate student is typically subordinate in the following contexts:

- As a candidate for employment, grants, awards, etc., after graduation when the advisor may be asked to provide letters of recommendation.

In addition, the faculty member may have considerable stature and influence in the scholarly community into which the student is likely to enter.
which constitutes additional, if less direct, authority over the student’s future. The existence of the above relationships affects other faculty–graduate student dynamics that are essential to the student’s progress. For example, a faculty advisor starts a company and later asks a graduate student to work for the company, perhaps for the summer or on a consulting basis. This raises conflicts of interest. The advisor may ask the student to work on a specific project related to the advisor’s research or writing papers, for example. This issue is not new to research universities and is typical in most universities.

2. Workload distribution. Promotions and Tenure decisions should be the negotiators for the institution. These discussions should include the advisor and other parties that have an interest in the outcome of the promotion or tenure decision. If the advisor is the senior person who is involved in the commercialization, the CO Committee may receive complaints. The committee should be aware of the potential conflicts and be prepared to address them. The committee should also consider the impact of the advisor’s involvement on the student’s progress. The advisor’s involvement in the promotion or tenure process may create a conflict of interest. The committee should be aware of these conflicts and address them appropriately.

3. Conflicts of interest connected with the Promotion and Tenure process. The CO Committee should be aware of the potential conflicts of interest that may arise when a faculty member is involved in commercialization activities. The committee should address these conflicts in a fair and ethical way. The committee should consult with the advisor and other parties involved in the promotion or tenure process to ensure that the process is fair and equitable.

4. Visitation. The CO Committee should be aware of the potential conflicts of interest that may arise when a faculty member is involved in commercialization activities. The committee should address these conflicts in a fair and ethical way. The committee should consult with the advisor and other parties involved in the promotion or tenure process to ensure that the process is fair and equitable.

5. Workload distribution. Promotions and Tenure decisions should be the negotiators for the institution. These discussions should include the advisor and other parties that have an interest in the outcome of the promotion or tenure decision. If the advisor is the senior person who is involved in the commercialization, the CO Committee may receive complaints. The committee should be aware of the potential conflicts and be prepared to address them. The committee should also consider the impact of the advisor’s involvement on the student’s progress. The advisor’s involvement in the promotion or tenure process may create a conflict of interest. The committee should be aware of these conflicts and address them appropriately.

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7. Workload distribution. Promotions and Tenure decisions should be the negotiators for the institution. These discussions should include the advisor and other parties that have an interest in the outcome of the promotion or tenure decision. If the advisor is the senior person who is involved in the commercialization, the CO Committee may receive complaints. The committee should be aware of the potential conflicts and be prepared to address them. The committee should also consider the impact of the advisor’s involvement on the student’s progress. The advisor’s involvement in the promotion or tenure process may create a conflict of interest. The committee should be aware of these conflicts and address them appropriately.

8. Visitation. The CO Committee should be aware of the potential conflicts of interest that may arise when a faculty member is involved in commercialization activities. The committee should address these conflicts in a fair and ethical way. The committee should consult with the advisor and other parties involved in the promotion or tenure process to ensure that the process is fair and equitable.

9. Workload distribution. Promotions and Tenure decisions should be the negotiators for the institution. These discussions should include the advisor and other parties that have an interest in the outcome of the promotion or tenure decision. If the advisor is the senior person who is involved in the commercialization, the CO Committee may receive complaints. The committee should be aware of the potential conflicts and be prepared to address them. The committee should also consider the impact of the advisor’s involvement on the student’s progress. The advisor’s involvement in the promotion or tenure process may create a conflict of interest. The committee should be aware of these conflicts and address them appropriately.

10. Visitation. The CO Committee should be aware of the potential conflicts of interest that may arise when a faculty member is involved in commercialization activities. The committee should address these conflicts in a fair and ethical way. The committee should consult with the advisor and other parties involved in the promotion or tenure process to ensure that the process is fair and equitable.

Conclusion

Although this memo necessarily raises problems that can occur in the process of commercialization, it is not intended to denigrate the process. Indeed, significant technologies—processors, servers, operating systems, databases, search engines, and so on—that we use every day were invented by students and faculty at universities, and were disseminated through the formation of new companies. Commercialization, despite the potential concerns outlined in this memo, is an effective means of transferring the accomplishments of the research community into practice for the benefit of society.

The conclusion, therefore, is not that commercialization carries with it too many risks for the universities to be worth pursuing. The risks, though real, can be managed, as has been described. Rather, the conclusion is that commercialization carries too many opportunities and benefits to let these manageable risks stand in the way of transferring university-produced knowledge into practice.

End Notes

1. The relationship of concern is principally the one between faculty and their graduate students. The relationship with undergraduate students is also important; however, when the intellectual property is created, undergraduates are often tuition payers rather than research assistants who receive stipends. This fact further complicates the problem beyond the scope of this discussion. As the overall guideline emphasizes, all relationships should be conducted in a fair and ethical way.

2. This arrangement, where the university licenses to a company formed by anyone, is based on the university’s ownership of the IP stipulated in Bayh-Dole for federally funded research. Other IP may or may not be owned by the university, depending on university policy. If graduate student and faculty inventor owns and control the IP themselves, their interactions become even more complex.

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